

Claims:

1. A process of producing a xylose solution from a biomass hydrolysate or a part thereof, characterized by subjecting said biomass hydrolysate to nanofiltration and recovering as the nanofiltration permeate a solution enriched in xylose.

2. A process as claimed in claim 1, characterized by recovering as the retentate a solution including lignosulphonates, oligosaccharides, hexose sugars and divalent salts.

10 3. A process as claimed in claim 1 or 2, characterized by recovering as the nanofiltration permeate a xylose solution having a xylose content of over 1.1 times, preferably over 1.5 times, most preferably over 2.5 times that of the starting biomass hydrolysate, based on the dry substance content.

4. A process as claimed in claim 3, characterized by recovering a xylose solution having a xylose content of or over 1.5 to 2.5 times that of the starting biomass hydrolysate, based on the dry substance content.

5. A process as claimed in any one of the preceding claims, characterized in that the dry substance content of the starting biomass hydrolysate is 3 to 50 % by weight, preferably 8 to 25 % by weight.

20 6. A process as claimed in any one of the preceding claims, characterized in that the dry substance content of the starting biomass hydrolysate used as the nanofiltration feed is less than 30% by weight.

7. A process as claimed in any one of the preceding claims, characterized in that the biomass hydrolysate has a xylose content of 5 to 95 %, preferably 15 to 55 %, more preferably 15 to 40 % and especially 8 to 27 % by weight, based on the dry substance content.

8. A process as claimed in any one of the preceding claims, characterized in that the biomass hydrolysate is a spent liquor obtained from a pulping process.

30 9. A process as claimed in claim 8, characterized in that the spent liquor obtained from a pulping process is a spent sulphite pulping liquor.

10. A process as claimed in claim 9, characterized in that the spent sulphite pulping liquor is an acid spent sulphite pulping liquor.

11. A process as claimed in claim 9 or 10, characterized in that the spent sulphite pulping liquor is obtained from hardwood sulphite pulping.

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12. A process as claimed in any one of the preceding claims, characterized in that the biomass hydrolysate has been subjected to one or more pretreatment steps.

13. A process as claimed in claim 12, characterized in that the pretreatment steps are selected from ion exchange, ultrafiltration, chromatography, concentration, pH adjustment, filtration, dilution, crystallization and combinations thereof.

14. A process as claimed in claim 8, characterized in that the spent liquor is a mother liquor obtained from the crystallization of xylose.

15. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration is carried out at a pH of 1 to 7, preferably 3 to 6.5, most preferably 5 to 6.5.

16. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration is carried out at a pressure of 10 to 50 bar, preferably 15 to 35 bar.

17. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration is carried out at a temperature of 5 - 95 °C, preferably 30 to 60 °C.

18. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration is carried out with a flux of 10 to 100 liters/m²h.

19. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration is carried out using a nanofiltration membrane selected from polymeric and inorganic membranes having a cut-off size of 100 to 2500 g/mol.

20. A process as claimed in claim 19, characterized in that the cut-off size of the nanofiltration membrane is 150 to 1000 g/mol.

21. A process as claimed in claim 20, characterized in that the cut-off size of the nanofiltration membrane is 150 to 500 g/mol.

22. A process as claimed in any one of claims 12 to 21, characterized in that the nanofiltration membrane is selected from ionic membranes.

23. A process as claimed in any one of claims 19 to 21, characterized in that the nanofiltration membrane is selected from hydrophobic and hydrophilic membranes.

24. A process as claimed in any one of claims 19 to 23, characterized in that the nanofiltration membrane is selected from cellulose acetate membranes, polyethersulfone membranes, sulfonated polyether sulphone

membranes, polyester membranes, polysulfone membranes, aromatic polyamide membranes, polyvinyl alcohol membranes and polypiperazine membranes and combinations thereof.

25. A process as claimed in claim 24, characterized in that
5 the nanofiltration membrane is selected from sulfonated polyether sulfone membranes and polypiperazine membranes.

26. A process as claimed in claim 24 or 25, characterized in that the nanofiltration membrane is selected from NF-200 and Desal-5 DK membranes.

10 27. A process as claimed in any one of claims 19 to 26, characterized in that the form of the nanofiltration membrane is selected from sheets, tubes, spiral membranes and hollow fibers.

28. A process as claimed in any one of claims 19 to 27, characterized in that the nanofiltration membrane is selected from high shear type
15 membranes.

29. A process as claimed in any one of claims 19 to 28, characterized in that the nanofiltration membrane has been pretreated by washing.

30. A process as claimed in claim 29, characterized in that
20 the washing agent is selected from ethanol and/or an alkaline detergent.

31. A process as claimed in any one of the preceding claims, characterized in that the nanofiltration process is repeated at least once.

32. A process as claimed in any one of the preceding claims, characterized in that the process is carried out batchwise or continuously.
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33. A process as claimed in any one of the preceding claims, characterized in that the process is carried out using a nanofiltration equipment including several nanofiltration elements arranged in parallel or series.

30 34. A process as claimed in any one of the preceding claims, characterized in that the process also comprises one or more pretreatment steps.

35. A process as claimed in claim 34, characterized in that the pretreatment steps are selected from ion exchange, ultrafiltration, chromatography, concentration, pH adjustment, filtration, dilution, crystallization and combinations thereof.
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36. A process as claimed in any one of the preceding claims, characterized in that the process also comprises one or more post-treatment steps.

37. A process as claimed in claim 36, characterized in that
5 the post-treatment steps are selected from ion exchange, crystallization, chromatography, concentration and colour removal.

38. A process as claimed in claim 36, characterized in that the process comprises reduction as a post-treatment step to convert xylose to xylitol.

10 39. A process as claimed in any one of the preceding claims, characterized in that the solution enriched in xylose and recovered as the nanofiltration permeate also includes other pentose sugars.

40. A process as claimed in claim 39, characterized in that said other pentose sugars comprise arabinose.

15 41. A process as claimed in any one of claims 2 to 40, characterized in that said hexoses recovered in the nanofiltration retentate comprise one or more of glucose, galactose, rhamnose and mannose.

42. Use of the xylitol solution obtained in accordance with a process as claimed in any one of claims 1 to 37 for the production of xylitol.

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